THE ODONATA OF THE BIOLOGIA CENTRALI-AMERICANA.*

By Raymond C. Osburn,
New York City.

The final section of this admirable work by Professor P. P. Calvert, of the University of Pennsylvania, made its appearance near the close of 1908, marking the completion of a research extending over nearly a decade for Professor Calvert, after it had been successively undertaken and abandoned by McLachlan, Hagen and Karsch. Dr. Calvert began this work in 1899, and the first section appeared in 1901. The complete work consists of an introduction of 25 pages, dealing chiefly with distribution and sources of material; the body of the work, 325 pages, and a supplement of 68 pages, dealing with additional material received too late to be incorporated in the main part. A very complete index, including all synonymic names, follows. The nine lithographed plates include 404 figures, showing the essential features of all the new, as well as of many hitherto imperfectly known species.

The region covered by this report comprises all the Central American States, with Panama on the south, and Mexico, with the immediately adjoining parts of Texas, New Mexico, Arizona and California, which present the same climatic conditions as northern Mexico, on the north. These limits include a very natural area of distribution for the Odonata, plainly marked off from the West Indies also, as the analysis of the data indicates. The list for this area includes 71 genera, embracing 293 species and varieties, and of this list 18 genera are represented by species found only in this region, and 143 species, almost half the entire number, are not known to occur elsewhere.

A comparison of the dragonfly fauna of this area (to which we may refer briefly as the "central" region) with that of the rest of North America ("northern" region) yields some interesting results. The number of species at present known from the two regions is approximately the same, notwithstanding the much greater area of the northern region, but the number of genera in the central region is considerably in excess of that in the northern. The proportions of the species in the

* A review, read before the N. Y. Ent. Soc. at its meeting on January 5, 1909.

two suborders, Zygoptera 142, Anisoptera 161, are much more nearly equal than in the northern region, where the Anisoptera are in much greater excess.

There are numerous interesting cases of replacement of similar genera when we compare the two faunas. Thus among the Calopteryginæ the genus *Hetærina* is represented in the central region by 17 species, while not more than 3 occur in the northern region. *Calopteryx*, on the other hand, has 8 northern species, while Calvert's list contains only one. Among the Agrioninæ, the genus *Enallagma*, with more than 20 northern species, has but 5 representatives in the central region, but this defect is more than balanced by the genus *Argia*, which is represented in the central region by 48 species, while but 8 occur in the rest of North America. In the Gomphinæ, the genus *Gomphus*, with some 35 northern species, is not found in the central region, nor are the related genera, *Ophiogomphus*, *Dromogomphus*, *Hagenius* and *Tachopteryx*. However, there do occur *Epigomphus* and *Gomphoides*, not found in the northern region, and *Progomphus* and *Erpetogomphus*, each with a single northern representative. The Corduligasterinæ are scantily represented by two species, and of the Cordulinæ, of which there are about 40 species in the northern region, the only undoubted record is that of a larva (species undeterminable) of a *Macromia* taken in northern Mexico. The Libellulinæ are, however, richly represented, with 28 genera and 97 species, of which number 18 genera and 75 species do not occur in the northern region. Our common northern genera, *Celithemis* (with 6 sp.) and *Leucorhinia* (6 sp.) have not been found in the central region, and *Sympetrum* (17 sp.) and *Libellula* (20 sp.) are represented respectively by 2 and 8 species in the central region. On the other hand, *Micrathyria* (9 sp.) and *Brechmorhoga* (9 sp.) do not occur in the northern region, and *Erythrodiplax* (15 sp. and var.) is represented scantily in southern United States, while one species (*E. berenice*) ranges coastwise as far as Massachusetts.

Naturally, Calvert has found it necessary to do a great deal of revising in connection with this work, yet with commendable conservatism, he has chosen to give us but two genera, *Hesperagrion* and *Metaleptobasis*, both belonging to the Agrioninæ and neither of them including any northern species. It was to be expected that many new species would appear in a region so little studied previously, but one is scarcely prepared to meet with such a number, 81, until he

considers the enormous amount of material from this region, nearly 11,000 specimens, which has been in Dr. Calvert's hands. As we should expect, these new species occur most frequently among the smaller Zygoptera, the genus *Argia* containing the surprisingly large number 22 (as against 26 species previously known). The presence of such an array of the smaller, more inconspicuous species is due not only to the very careful analysis of the material, but it is in a good measure traceable to the recent collecting trips of a number of experienced odonatologists (besides Calvert himself) into this region. The collections and notes made by these gentlemen, fully accredited in the work, have added largely in many ways to the value of the paper.

This work of Calvert's stands alone in American odonatology. The only paper of sufficient scope to be in any way comparable is Hagen's Synopsis of N. A. Neuroptera (1861) and that was pioneer work. But for that matter there are few works in the whole field of systematic entomology which can be compared with this when we consider the amount of material studied as well as the thoroughness, care and painstaking effort with which all the details of the material have been searched and weighed. It is a model of modern systematic entomology and the reviewer heartily recommends to all students of systematics a careful consideration of the methods employed by Calvert in the pursuit of this work.* The elimination of "snap" judgment, and even to a great degree, of the personal equation, by long series of measurements in the study of genera, species and variations, may not appeal strongly to some entomologists, but it is scientific and assures a safe basis for permanence of results.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF OCTOBER 6, 1908.

Held at the American Museum of Natural History, President C. W. Leng presiding, with eleven members and three visitors present.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges since May, 1908.

Bull. 46 and 48, University of Montana.

Mittheil. a. d. Zool. Mus. in Berlin, III, No. 4; IV, No. 1.

The Polymorphism of Ants, by W. M. Wheeler.

* See "Science," Nov. 13, 1908, for Calvert's own account of his methods.